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Information Bulletin

Grade 3 Mathematics

*1993-94
School Year*

This document was written primarily for:

Students	✓
Teachers	✓
Administrators	✓
Parents	
General Audience	
Others	✓ (Superintendents)

This bulletin contains general information about the 1994 Achievement Testing Program and information specific to Grade 3 Mathematics Assessment. Additional copies of the bulletin may be obtained by telephoning Alberta Education at 427-0010.

DISTRIBUTION: Superintendents of Schools • School Principals and Teachers • The Alberta Teachers' Association • Alberta School Boards Association • Officials of Alberta Education • General Public upon Request.

October 1993

Contents

General Information	1
Administering the Assessment	1
Schedule	1
Reporting the Results	2
Broadened Assessment Initiatives	2
 Description of the Mathematics Assessment Standards	 2
Introduction	2
Purpose of Assessment Standards	2
Acceptable Standard	2
Standard of Excellence	3
 Grade 3 Mathematics Assessment	 3
General Description	3
Machine-Scorable Component	4
Reporting Categories Indicators	4
Blueprint for Mathematics Assessment	5
Performance-Based Component	5
Learning Contexts Survey	5
Confirming Standards	6
 Suggestions for Teachers Administering the Following Assessment Example	 6
Section 1: Assessment Example	7
Section 2: Number Facts Sample Questions	17
 Preparing Students for the Assessment	 18
Suggestions for Answering Machine-Scorable Questions	18
Suggestions for Answering Timed Number Facts Questions	18
 Credits	 inside back cover
 Alberta Education Contacts	 inside back cover

General Information

The Achievement Testing Program provides Alberta Education, school jurisdictions, schools and the public with information significant at the provincial and local levels about what students know and can do in relation to provincial standards. It does not provide information to be used for student placement or promotion.

The assessments are administered on a four-year cycle in four subject areas—language learning; social studies, mathematics, and science—and at three grade levels—3, 6, and 9.

The assessments are based on provincial standards as reflected in the *Program of Studies* prescribed by the Minister of Education. Classroom teachers from across the province are extensively involved in developing and field testing the assessment instruments.

Administering the Assessment

Information about the nature and administration of the provincial assessments, about exemptions and special provisions, and about students receiving instruction in French can be found in the *Achievement Testing Program General Information Bulletin, 1993–94 School Year*, which has been mailed to all superintendents and principals.

Schedule

The achievement tests must be administered during the week of June 6 to June 10, 1994. The tests can be scheduled at any time during that week, as approved by the superintendent. We recommend, however, that schools organize their calendars so that the tests are completed on Tuesday, June 7.

Students who are absent when the tests are administered and who return to school by June 10 must write the tests upon their return. By scheduling the tests early in the week, schools can ensure that most, if not all, absentees are tested. The tests from a school must be returned to Alberta Education as soon as possible after completion, and no later than June 13, 1994.

The tests that will be administered in 1994 are:

Grade 3 Mathematics (English and French translation)

Grade 6 Science (English and French translation)

Grade 9 English Language Arts (*Part A: Writing* and *Part B: Reading*)

Français 9^e Année (*Partie A: Production écrite* and *Partie B: Lecture*).

For June 1994, a French translation of the Grade 3 Mathematics Achievement Test will be available. Those superintendents who wish to have their students in French language programs participate in this assessment should indicate their requests on the *Enrolment Information Request—June 1994* forms. Alberta Education will send enrolment forms to schools by February 1994 requesting an indication of how many English or French tests are required. These forms must be returned through jurisdiction offices by March 5, 1994.

The principal is responsible for ensuring the security of the tests from the time they are received until they are returned to Alberta Education. To minimize any risks to security, we recommend that all students complete the test on the same day.

Reporting the Results

In mid-October 1994, each school jurisdiction will receive a district profile and school reports for their students' achievement, as well as guidelines for interpreting these results in relation to provincial standards.

To facilitate reflection on school programs, we expect that results will be shared with school staff (not just teachers of grades 3, 6, and 9), as well as with parents and the community.

We also expect that Individual Student Profiles will be shared, upon request, with parents.

In December 1994, provincial results will be made public through the annual *Achievement Testing Program Provincial Report*.

Broadened Assessment Initiatives

The Student Evaluation Branch has developed instruments to collect a broader base of information to help provide a more complete picture of what students know and can do. These instruments will be administered to a provincial sample of students in the spring of 1994 as follows:

Grade 3

- open-ended problem-solving activities in mathematics

Grade 6

- performance tasks in science

Grade 9

- listening and viewing skills activities in English Language Arts

The information from these broadened assessments will complement that already provided by the provincial achievement tests.

Description of the Mathematics Assessment Standards

Introduction

The provincial standards below are used to assess how well students have learned grade 3 Mathematics. While these standards primarily reflect the general learner expectations of the Alberta course of studies, they describe essential learnings that all Alberta students are expected to achieve. Provincial standards are useful, therefore, for assessing Grade 3 students in all types of school programs—public, private, and home education.

Purpose of Assessment Standards

These statements describe what is expected of Grade 3 students who are meeting the *acceptable standard* or the *standard of excellence* on independent work at the end of the Grade 3 Mathematics program. These statements represent the standards against which student achievement will be measured. By comparing actual results to expected provincial standards, decisions can be made about whether achievement is in fact "good enough."

Acceptable Standard

Students who meet the acceptable standard in Grade 3 Mathematics are expected to have a basic understanding of mathematical concepts and related procedural knowledge. They are expected to be able to demonstrate their understanding in concrete, pictorial, and symbolic modes and be able to translate from one mode to another. For example, students meeting the acceptable standard should know that the solution to the number sentence $12 - 3 = \square$ is 9 and be able to demonstrate their understanding in concrete and pictorial ways. They are expected to be able to write related number sentences and

verify them using manipulatives and diagrams.

To meet the acceptable standard students are expected to present ideas in an understandable way using objects, diagrams, and appropriate every-day language.

Students meeting the acceptable standard are expected to perform the mathematical operations and procedures that are fundamental to the program and apply what they know in solving simple problems in familiar settings. They are able to describe, to a limited degree, the steps they used to solve a particular problem.

The expectation is that students meeting the acceptable standard have a positive attitude about mathematics in their daily lives. They are able to demonstrate confidence when using simple mathematical procedures and when applying problem-solving strategies in familiar settings.

Standard of Excellence

Students who meet the standard of excellence in Grade 3 Mathematics are expected to have a superior understanding of mathematical concepts and related procedural knowledge. They are consistently able to demonstrate their understanding in concrete, pictorial, and symbolic modes and easily translate from one mode to another. They are able to create problem situations to illustrate concepts and to analyze and explain relationships among concepts. For example, students meeting the standard of excellence should be able to write all number sentences related to $12 - 3 = \square$, justify them using manipulatives and diagrams and create problem situations to exemplify the relationship. They should be able to explain how $12 \div 3 = \square$ is related to $12 - 3 = \square$; also, they should be able to explain why they are not related number sentences.

To meet the standard of excellence, students are expected to verbalize and write about mathematical situations clearly, using correct technical terms.

Students meeting the standard of excellence are expected to perform the mathematical operations and procedures that are fundamental to the program and to be able to apply what they know in solving and creating novel problems. They are able to clearly describe the steps that they or other students used.

Students meeting the standard of excellence should have a positive attitude toward mathematics and show confidence in performing mathematical tasks. They are expected to be self-motivated risk-takers who persevere when solving novel problems. They take initiative in trying new methods and are creative in their approach to problem solving.

Grade 3 Mathematics Assessment

General Description

The Grade 3 Mathematics Assessment is designed to assess performance in relation to provincial standards as reflected in the learner expectations of the *Elementary Mathematics Program of Studies, 1982*.

The Assessment consists of three components:

- *Machine-scorable component*—completed by all Grade 3 students in the province
- *Performance-Based component*—completed by a provincial sample of Grade 3 students
- *Learning Contexts Survey*—completed by a provincial sample of Grade 3 teachers and students

Machine-Scorable Component

The machine-scorable component consists of two sections:

Section one has 50 questions integrated in a two part narrative. Parts A and B will be approximately the same length. Students should be given 30 to 45 minutes to complete the questions in each part with a recess break between parts A and B.

The blueprint for section one is on page 5 of this bulletin and is followed by sample assignment questions that teachers can use with students to help them prepare for the provincial assessment.

Section two consists of timed tests of number facts in addition and subtraction. Section two may take up to 30 minutes to administer.

Students will record answers to all questions directly in the test booklets.

Students will require HB pencils, rulers, and erasers. They will also need scrap paper.

Students may use manipulative materials and calculators **only** when completing section one of the machine-scorable component.

Reporting Categories Indicators

The following points briefly highlight the learnings for each reporting category.

Knowledge and Skills

- recalls facts, concepts, terminology
- knows number facts
- recognizes place value
- performs algorithms, computations
- performs constructions, measurements
- uses calculators, computers
- knows mental computation, estimation strategies

Problem Solving and Application

- demonstrates conceptual understanding by:
 - representing basic mathematical concepts in concrete, pictorial, and /or symbolic modes
 - applying a mathematical concept in familiar situations
 - creating new problem situations that exemplify a concept
 - judging reasonableness of answers
 - justifying answers
 - communicating why and when certain strategies are appropriate
- understands basic mathematical concepts
- understands relationships among numbers, operations, number forms, and modes of representation
- understands relationships among geometric forms
- understands the problem-solving process
- uses a variety of strategies
- applies mathematical concepts to new situations

Blueprint for Mathematics Assessment

Strands	Reporting Categories		Total Number of Questions*
	Knowledge and Skills	Problem Solving and Application	
Numeration	6	9	15
Operations and Properties	7	9	16
Measurement	3	6	9
Geometry	2	3	5
Graphing	1	4	5
Total Number of Questions	19	31	50

* The number of questions on the test may vary slightly from those indicated.

Performance-Based Component

Performance-based assessment provides students with real-life problem-solving activities. This assessment addresses the learner expectations that cannot be easily measured using only paper and pencil strategies. In 1994, a provincial sample of Grade 3 students from across the province will be selected to participate in the activity-based assessment. The problem-solving and writing activities involved in the assessment have been developed by teachers and have been designed to model good classroom instruction and assessment methods.

Students will be asked to read a book and then solve several problems related to the context of the book. They will also be asked to reflect on their strategies and answers in written form. From this assessment, we will obtain valuable information about how students apply their knowledge in different areas when solving real-life problems.

Learning Contexts Survey

In 1994, learning context survey questionnaires will be given to a provincial sample of Grade 3 teachers and students.

The purpose of the student questionnaire is to examine the extent to which important math attitudes are evident, to look at student attitudes toward mathematics, and to correlate these attitudes with achievement.

The purpose of the teacher questionnaire is to study the effect of classroom environment, instructional strategies, approaches to problem solving, and use of manipulative materials on student achievement.

Confirming Standards

Confirming standards is a process whereby judgments about students' performance on the assessment are made in relation to provincial standards. For more information on confirming standards procedures, refer to Appendix A of the *Achievement Testing Program Provincial Report, June 1992 Administration*. For information on the selection of teachers for participation in the confirming standards process, refer to the *Achievement Testing Program General Information Bulletin, 1993–94 School Year*.

Suggestions for Teachers Administering the Following Assessment Example

The following suggestions are to help teachers administer the sample assessment in the same way that section one of the machine-scorable component will be administered.

Read the text that appears on the first page of the sample assessment (page 6 of this bulletin) to your students. Feel free to discuss the map and opening part of the story. Help your students become comfortable with the story setting.

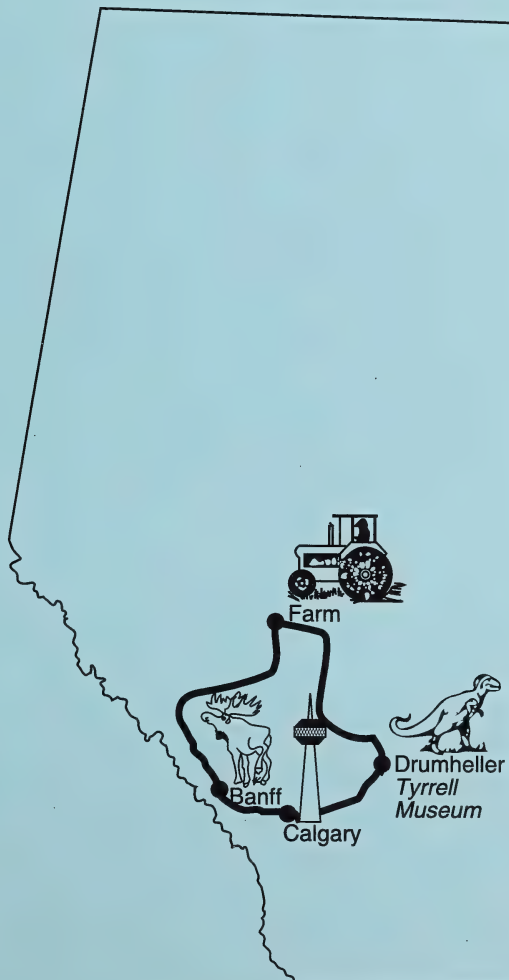
When the students are ready to work on the math questions, *instruct them to complete the questions independently.* Be careful to ensure that students know how to mark their answers to the questions directly on the page.

Section 1: Assessment Example

This collection of questions does not represent the test emphasis as presented in the blueprint.

VACATION TIME!

Pretend your friends came to Calgary to take a trip with you. You picked them up at the Calgary Airport and left on your trip. First you went camping and saw the sights in Banff National Park. Then you went to your Uncle Walter's and Aunt Vi's farm. Your final stop was the world famous Tyrrell Museum where you learned more about dinosaurs. Finally, you returned to Calgary. The map below shows where you went on your trip.



1. Your friends arrived on the last Saturday in June.

Shade in that square on the calendar.

June 1993						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

2. You left Calgary at 7:15 A.M.

After 55 min, you stopped for gas.

What time was it when you stopped?

- ☐ 7:55
- ☐ 8:00
- ☒ 8:10
- ☐ 8:15

3. The distance meter on your car read 517 km when you left the airport.

The meter read 692 km when you arrived at Banff.

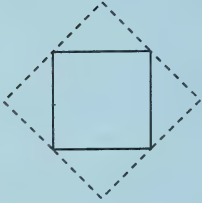
At Airport				At Banff			
			5			6	9
			1			2	
			7				

How far did you travel from the airport to Banff?

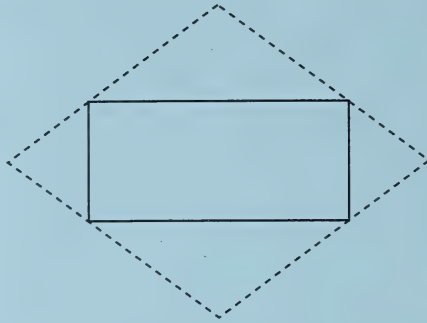
- ☐ 157 km
- ☐ 175 km
- ☐ 517 km
- ☐ 715 km

4. Your friends brought a cube pushout puzzle for you.

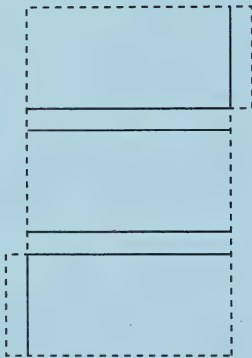
Which picture could be pushed out and folded to make a cube?



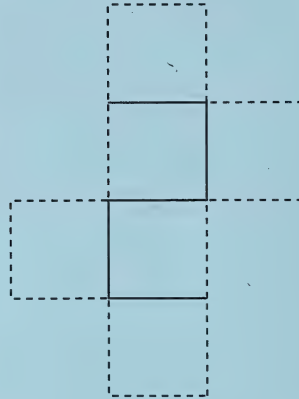
☐



☐



☐



☐

5. When you came into Banff, you drove 7 blocks, turned left, and went 5 more blocks.

You turned left again and drove 1 more block to get to the Tourist Information Center.

How many blocks did you travel in all?

- ☐ 12
- ☐ 13
- ☐ 14
- ☐ 15

From Banff, you went to your aunt's and uncle's farm.

Uncle Walter has ten milk cows. Six of the cows are being fed a special diet of hay and vitamins. Four of the cows are being fed only hay.

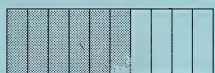
6. Which rectangle shows the fraction of the cows that are being fed a special diet?



☐ O



☐ O



☐ O



☐ O

7. Which decimal shows the fraction of the cows that are being fed a special diet?

- ☐ O 0.4
☐ O 0.6
☐ O 4.0
☐ O 6.0

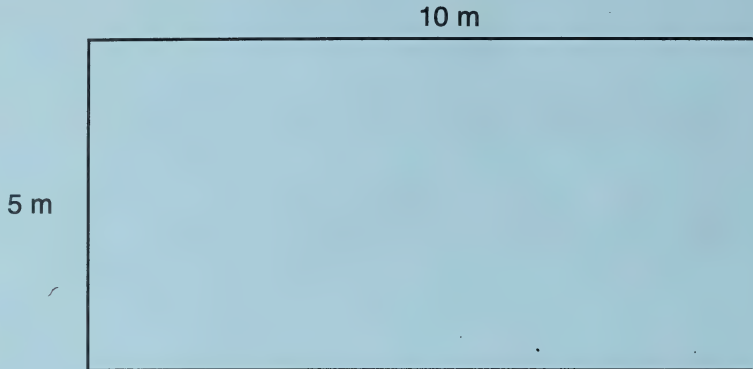
8. On Monday, Uncle Walter's neighbor collected 123 L of milk.

The family used 17 L. The rest of the milk was sold to the dairy.

How many litres of milk were sold?

- ☐ O 106
☐ O 114
☐ O 116
☐ O 140

Aunt Vi has a garden that is 5 m wide and 10 m long. She built a fence around it to keep animals out.



9. How many metres of fence did she need?

- ☐ 20 m
- ☐ 25 m
- ☐ 30 m
- ☐ 35 m

10. Aunt Vi watched the plants in her garden sprout. She saw that:

the carrots sprouted before the beans,
the corn sprouted after the beans, and
the potatoes sprouted before the carrots.

What is the order in which the plants sprouted?

- ☐ Potatoes, corn, carrots, beans
- ☐ Corn, potatoes, carrots, beans
- ☐ Carrots, corn, beans, potatoes
- ☐ Potatoes, carrots, beans, corn

11. The next stop was Drumheller.

Your friends asked how far it was to other cities.

Your map shows the following distances:

Edmonton	274 km
Red Deer	163 km
Calgary	138 km
Lethbridge	296 km
Medicine Hat	245 km

What is the order of these distances from **greatest** to **least**?

- ☐ 296 km, 245 km, 274 km, 163 km, 138 km
- ☐ 296 km, 274 km, 245 km, 163 km, 138 km
- ☐ 163 km, 138 km, 274 km, 245 km, 296 km
- ☐ 138 km, 163 km, 245 km, 274 km, 296 km

12. On the way to the Tyrrell Museum, there is a little church with a tower.



What is the name of the geometric shape shaded at the top of the tower?

- ☐ cone
- ☐ cylinder
- ☐ prism
- ☐ pyramid

13. After the visit through the museum, you went to the cafeteria.

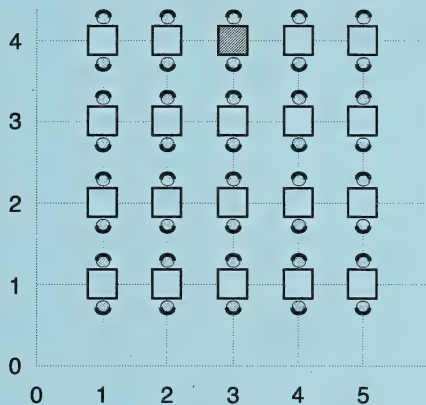
The tables were arranged in columns and rows.

Your friends went to the table at column 4, row 3.

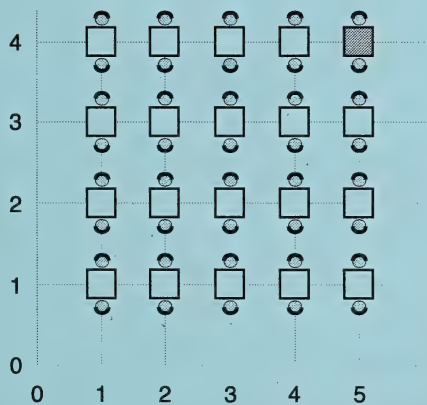
Which shows their table correctly shaded?



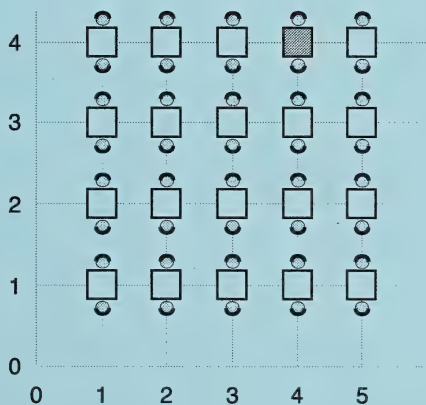
☐



☐



☐



☐

14. When you arrived back in Calgary, you wrote in your journal the total distance you traveled.

Your father said that the distance was “one thousand two hundred seven” kilometres.

How is this distance written as a number?

- ☐ 127
☐ 1027
☐ 1207
☐ 1270

Vacation Time!
Key and Descriptors

#	Key shades correct date	Program Strand	Reporting Category*	Curriculum Standard	Examples of Assessment Standard**
1		Measurement	P	Reads the date on the calendar	A
2	C	Measurement	P	Adds time and expresses it in digital form	E
3	B	Operations and Properties	K	Subtracts two 3-digit numbers with one regrouping	A
4	D	Geometry	P	Constructs a simple 3-dimensional object from a net	E
5	B	Operations and Properties	K	Adds three addends	A
6	C	Numeration	P	Recognizes a rectangle with 10 equal parts with 6 parts shaded and 4 unshaded represents $\frac{6}{10}$	A
7	B	Numeration	P	Writes the decimal from a physical situation	E
8	A	Operations and Properties	K	Subtracts a 2-digit number from a 3-digit number with one regrouping	A
9	C	Operations and Properties	P	Adds 2 addends and multiplies by 2	A
10	D	Numeration	P	Uses clues to order events	E
11	B	Numeration	P	Orders 3-digit numbers	A
12	D	Geometry	K	Identifies a 3 dimensional object as a pyramid	A
13	A	Graphing	P	Identifies the correct display of a specific position on a grid	E
14	C	Numeration	K	Reads and writes a number in the thousands	A

* P—Problem-Solving and Application, K—Knowledge and Skills

** A—Students meeting the acceptable standard should be able to correctly answer questions such as these;

E—In addition to answering the questions identified for the acceptable standard, students meeting the standard of excellence should be able to correctly answer questions such as these.

Section 2: Number Facts Sample Questions

ADDITION

<p>1.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: right;"> $\begin{array}{r} 4 \\ + 8 \\ \hline \end{array}$ </div> <div style="text-align: left;"> <input type="radio"/> 10 <input type="radio"/> 11 <input type="radio"/> 12 <input type="radio"/> 14 </div> </div>	<p>2.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: right;"> $\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$ </div> <div style="text-align: left;"> <input type="radio"/> 13 <input type="radio"/> 14 <input type="radio"/> 15 <input type="radio"/> 16 </div> </div>	<p>3.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: right;"> $\begin{array}{r} 1 \\ + 2 \\ \hline \end{array}$ </div> <div style="text-align: left;"> <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 12 </div> </div>	<p>4.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: right;"> $\begin{array}{r} 9 \\ + 9 \\ \hline \end{array}$ </div> <div style="text-align: left;"> <input type="radio"/> 9 <input type="radio"/> 16 <input type="radio"/> 17 <input type="radio"/> 18 </div> </div>
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<p>5.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="margin-right: 20px;"> $5 + 0 =$ </div> <div> <input type="radio"/> 0 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 50 </div> </div>	<p>6.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="margin-right: 20px;"> $8 + 4 =$ </div> <div> <input type="radio"/> 12 <input type="radio"/> 13 <input type="radio"/> 14 <input type="radio"/> 16 </div> </div>	<p>7.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="margin-right: 20px;"> $2 + 3 =$ </div> <div> <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 </div> </div>	<p>8.</p> <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="margin-right: 20px;"> $3 + 5 =$ </div> <div> <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 13 <input type="radio"/> 15 </div> </div>
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SUBTRACTION

<p>1.</p> <p>$3 - 1 =$</p> <p><input type="radio"/> 1</p> <p><input type="radio"/> 2</p> <p><input type="radio"/> 3</p> <p><input type="radio"/> 4</p>	<p>2.</p> <p>$11 - 6 =$</p> <p><input type="radio"/> 3</p> <p><input type="radio"/> 4</p> <p><input type="radio"/> 5</p> <p><input type="radio"/> 7</p>	<p>3.</p> <p>$8 - 4 =$</p> <p><input type="radio"/> 2</p> <p><input type="radio"/> 3</p> <p><input type="radio"/> 4</p> <p><input type="radio"/> 5</p>	<p>4.</p> <p>$17 - 8 =$</p> <p><input type="radio"/> 6</p> <p><input type="radio"/> 7</p> <p><input type="radio"/> 8</p> <p><input type="radio"/> 9</p>
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<p>5.</p> <div style="text-align: right; margin-right: 20px;"> $\begin{array}{r} 4 \\ -0 \\ \hline \end{array}$ </div> <div style="display: flex; justify-content: flex-end; align-items: center;"> <div style="text-align: center; margin-right: 10px;"> <input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 3 <input type="radio"/> 4 </div> </div>	<p>6.</p> <div style="text-align: right; margin-right: 20px;"> $\begin{array}{r} 16 \\ -9 \\ \hline \end{array}$ </div> <div style="display: flex; justify-content: flex-end; align-items: center;"> <div style="text-align: center; margin-right: 10px;"> <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 </div> </div>	<p>7.</p> <div style="text-align: right; margin-right: 20px;"> $\begin{array}{r} 9 \\ -7 \\ \hline \end{array}$ </div> <div style="display: flex; justify-content: flex-end; align-items: center;"> <div style="text-align: center; margin-right: 10px;"> <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 7 </div> </div>	<p>8.</p> <div style="text-align: right; margin-right: 20px;"> $\begin{array}{r} 7 \\ -7 \\ \hline \end{array}$ </div> <div style="display: flex; justify-content: flex-end; align-items: center;"> <div style="text-align: center; margin-right: 10px;"> <input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 7 <input type="radio"/> 14 </div> </div>
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Preparing Students for the Assessment

Share the following information with your students to help them prepare for the Mathematics assessment.

I strongly advocate preparing children to understand tests and testing through extensive class discussion about the makeup of the test and how to take it, and then adequate practice to find out their own particular weaknesses in approaching tests.

—Graves, p. 183

Familiarize your students with the format of the machine-scorable component of the assessment and the kinds of questions that will appear on it by having them work through the sample questions.

Suggestions for Answering Machine-Scorable Questions

The following suggestions are provided to help prepare students for Section 1 of the Grade 3 Mathematics machine-scorable component.

The questions in Section 1 are set in a story.

Your teacher will read some of the story to you before you complete the mathematics questions in each part. This will give a setting for the questions you do on your own.

Use other information given by:

- a. by looking at all the information and thinking carefully about it before you try to answer the questions; or

- b. by reading the questions first and then looking at the information, remembering the questions you need to answer.

When you need information for more than one question remember to *go back to the information before answering each question.*

Make sure you look at all types of information given. Information may be given in words, charts, pictures, graphs, and maps.

Check your work when you calculate an answer, even when your answer is one of the choices.

When answering questions, *choose the answer you think is best.* If you don't see a correct or best answer right away, try to find the two choices that seem closest to the correct answer and choose one of them.

Suggestions for Answering Timed Number Facts Questions

The following suggestions are to help prepare students for Section 2 of the Grade 3 Mathematics machine-scorable component.

Work through the questions at a steady speed. If you can't answer a question, leave that question and go on or choose an answer that you think might be correct and go on. Use your time to answer the questions you can do instead of worrying about the ones you can't do.

Credits

Donald H. Graves, *Build a Literate Classroom* (Toronto: Irwin Publishing, 1991) p. 183.

Alberta Education Contacts

Questions or comments regarding this bulletin should be directed to:

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Alberta Education
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11160 Jasper Avenue
Edmonton, Alberta
T5K 0L2

Telephone: (403) 427-0010
FAX: (403) 422-4200

or to the nearest Alberta Education Regional Office:

Grande Prairie Regional Office
#25, 12th Floor, 214 Place
9909 - 102 Street
Grande Prairie, Alberta
T8V 2V4

Telephone: (403) 583-5130

Calgary Regional Office
12th Floor, Rocky Mountain Plaza
615 Macleod Trail, SE
Calgary, Alberta
T2G 4T8

Telephone: (403) 267-6353

Edmonton Regional Office
7th Floor, Westcor Building
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